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(54) REARVIEW MIRROR WITH SETTING OR ADJUSTING MEANS

(71) I, ERICH WUNSCH, a German national, of 12 Im Hofrain, Schwieberdingen, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a rearview mirror for motor vehicles or the like with setting or adjusting means, with the aid of which the rearward field of view of the driver can be adapted also when the vehicle is travelling both to his sitting and driving position and to the particular traffic situation.

To solve this problem a great variety of special forms of rearview mirrors has already been proposed but none of them has so far been completely satisfactory. Thus, a rearview mirror is known which has two mirror plates in which in addition to the normal mirror plate, which covers the rearward road area, a second mirror plate is provided which is angled with respect to the first along a substantially vertical line and covers an area lying more to the side of the vehicle so that with this mirror assembly a total of two images results. These two images frequently irritate the driver because simultaneous consideration and correct interpretation of the two images requires special concentration and in particular practice. Experience has shown that many users of such divided mirrors require a long familiarisation time before they can use them properly and in some cases never become able to do so. Moreover, the blind angle is still not completely eliminated because motor or pedestrian traffic for example directly adjacent a vehicle is still not visible and this is a frequent cause of serious accidents.

The problem underlying the present invention is therefore to construct a rearview mirror so that is provides adequate viewability not only of the rearward road area but also, preferably simultaneously, of the lateral area adjacent the vehicle up to the level of the driver and of the area beneath the lateral field of view and thus substantially eliminates a blind angle.

According to the present invention there is provided a rearview mirror for a vehicle or the like, the mirror having a support; a mirror plate pivotally mounted for pivoting about a first axis and a second axis relative to the support; means for mounting the support on a vehicle bodywork so that the first axis is substantially vertical and the second axis is substantially horizontal; remotely controllable adjusting means for adjusting the position of the mirror plate relative to the support guide means for guiding the pivotal movement of the mirror plate; and a damping device for damping the pivotal movement of the mirror plate.

Preferred features of the present invention are set out in the appendant sub-claims.

The pivotal movement may be effected by an electrical lift and/or pull means influencing the position of the mirror plate Such electromagnetically or electrothermally operating adjusting means may be used with particular advantage because they are simple in construction, reliable, cheap and maintenance-free.

They may for example be controlled by

the flasher for the direction indicator of the vehicle so that the mirror plate adjustment into the laterally and vertically tilted position takes place whenever the flasher is operated for an overtaking manoeuvre.

The mirror pivoting may be effected in time with the flasher or via an additional switch which is actuated for a brief time when the flasher is switched on.

The individual adjustability of the lateral and vertical tilt angle may be provided by the arrangement of a control disk in the control slot of which the pin carrying the mirror plate is guided and limited in its angular deflection by adjustable stops.

The electrical power supply of the adjusting means may be connected to the vehicle electrical system in such a manner that when the vehicle ignition is switched off the mirror plate pivots automatically into the lateral and/or vertical position so that the driver can see the lateral area of the vehicle in the rearview mirror before opening the vehicle door.

To eliminate misinterpretation of the image apparent to the driver in the rearview mirror it may be advantageous to provide a switch which is actuable via the adjusting means and which controls a control indication in the interior of the vehicle which indicates by an optical and/or acoustic signal to the driver in which pivot position the mirror plate is disposed.

The invention will be explained in detail hereinafter with the aid of the examples of embodiment illustrated in the drawings, wherein:

Fig. 1 is a schematic plan view of a road with two vehicles,

Fig. 2 is a schematic side elevation of the left side of a vehicle and a cyclist,

Fig. 3 is a partially sectioned plan view of a mirror according to an embodiment with rigid mirror plate in the housing,

Fig. 4 is a view of the control disk of the mirror in Fig. 3 seen against the direction of travel,

Fig. 5 is a view corresponding to Fig. 4 of a modified control disk,

Fig. 6 is a view of a control disk according to a further embodiment seen against the direction of travel,

Fig. 1 shows a road 10 with normal lane 11 and overtaking lane 12 on which a vehicle 13 is being overtaken by a vehicle 14. The exterior rearview mirror 15 of the vehicle 13 is constructed according to the invention. In the rest position of the mirror 15 the driver of the vehicle 13 has the angle of view 16. The vehicle 14 is not visible in the mirror 15 of the vehicle 13. The angle 17 of view shown in dashed line results for the driver of the vehicle 13 when the mirror 15 has been adjusted out of the rest position about a substantially vertical axis to the left outwardly into a laterally tilted position. The vehicle 14 is then in the field of view of the driver and not in the blind angle.

Fig. 2 shows alongside the vehicle 13, but beneath the lateral angle of view of the driver, a cyclist with bicycle 18. In the rest position of the mirror 15 the vertical angle of view 19 is obtained. The bicycle 18 is not visible for the driver of the vehicle 13. The mirror 15 obviates this blind angle as well. The vertical angle of view 20 results when the mirror is moved out of its rest position about a substantially horizontal axis downwardly into a vertically tilted position. The bicycle 18 is then visible in the mirror 15. Thus, a blind angle may be eliminated by means of the mirror both in the lateral direction and in the vertical direction.

In the embodiment shown in Figs. 3, 4, a mirror plate is held fixedly in the mirror housing 51 which carries a pin 53 with ball 69 which is pivotally moveable in a ball mounting 71 on the arm 54 for movement about the horizontal axis 33 (angle β) and vertical axis 32 (angle α). The arm 54 is mounted via a ball joint 23 and a support 24 on the vehicle. An additional pivot joint 55 may be provided between the pin 53 and the mirror housing 51. The axes 32 and 33 intersect each other and the longitudinal centre axis 68 of the pin 53 in the centre point of the ball 69 and are directed at right angles to the longitudinal centre axis 68. The pin 53 is articulately engaged by an end 57 of a pull and/or push magnet 58 with energising coil which comprises a plunger armature operating against a pressure spring 59.

Furthermore, an oppositely acting damping device 60 is provided. A control disk 61 is held by means of clamps 62 for rotational adjustment on the mounting 71 and when said clamps are released the control disk 61 may be adjusted in the direction of rotation. The control disk 61 comprises an inclined slot 63 through which the pin 53 passes and which is positioned inclined with a planar coordinate system (axes 32 and 33) in such a manner that a guiding of the pin 53 along the inclined slot 63 results in a vertical tilting (angle β) about the axis 33 downwardly and simultaneously a lateral tilting (angle α) about the axis 32 outwardly and back. The inclined slot 63 runs from the bottom right to the top left (Fig. 4).

In the rest position of the mirror housing 51 the pin 53 is at the right lower edge in the inclined slot 63 (Fig. 4).

On excitation of the electromagnet 58 the plunger armature is drawn against the pressure spring 59 into the interior, the damping device 60 having an opposite damping effect. The tensile force acting at

the end of the pin 53 displaces the latter from the inclined slot 63 from the bottom right to the top left and results in a lateral tilting about the axis 32 through the angle α and a superimposed vertical tilting about the axis 33 through the angle β. On deenergisation of the pull magnet 58 the pin 53 is moved back by the expanding pressure spring 59 into the rest position (Fig. 4).

The ball 69 has on a peripheral major circle lying in the plane of the drawing, i.e., within a diametrical plane of the ball containing the ball centre point, the pin longitudinal centre axis 68 and the axis 33, a guide groove in the form of a recess 70. Attached to the mounting 71 is a securing pin 72 whose free end 74 engages in the groove 70. The securing pin 72 is directed at right angles to the longitudinal centre axis 68 and towards the ball centre point and runs in the direction of the axis 33 so that the bolt axis forms a horizontal pivot axis for the vertical tilting of the housing 51 downwardly and back. Furthermore, a free pivoting of the ball 70 about the axis 32 is possible. On the other hand, due to the engagement in the recess 70 a rotation of the pin 53 about its longitudinal centre axis 68 is prevented.

An optical and/or acoustic control indication 88 in the vehicle with a switch 90 connected into its separate or independent supply circuit 89 serves to indicate the mirror position. The switch is mounted on the mounting 71 and projects with its switch member at the upper end (Fig. 3) of the inclined slot 63 into the latter. On movement of the pin 53 in the inclined slot 63 up to the upper end the switch 90 closes, thus closing the circuit 89 independent of the magnet circuit. The control indication 88 indicates to the driver the pivoted-out laterally and/or vertically pivoted position of the mirror.

Fig. 4 shows a modification in which the pin 53 comprises on both sides of the guide edges of the inclined slot 63 on its outer surface two opposing slide faces 75 and 76 directed in the direction of the inclined slot 63, for example plane chamfers, which are supported at the guide edges of the inclined slot 63 to secure the pin 53 against rotation about its longitudinal centre axis 68.

In the modification of Fig. 5 the guide of the pin 53 comprises a vertical slot 66 for the vertical tilting (angle β) and a substantially adjoining horizontal slot 67 for the subsequent lateral tilting (angle α).

In the embodiment shown in Fig. 6, the pin 53 comprises at the end engaged by the magnet 58 as substantially shown in Fig. 4 two opposite plane faces 78, 79 over which engage two flat legs 81, 82 of a fork 80 at the end of the magnet 58. The flat legs 81, 82 are articulately connected to the pin 53 via a bearing pin 83 which passes transversely through the pin 53. The magnet 58 extends in the direction of the inclined slot 63 and at the end opposite the fork 80 is articulately mounted on the mounting or the mirror arm by means of an end fork 84 about an axis parallel to the bearing pin 83.

The pin (53) may be fixedly connected to the mirror housing 51 adjacent the ball joint 69, either between the latter and the mirror housing 51 or on the side of the ball joint 69 remote from the mirror housing 51, the end 57 of the electromagnetic push and/or pull magnet 58 constituting the adjusting means, engaging articulately, the magnet being secured with its other end to the arm 54.

The switch 90 may be disposed between the mirror housing 51 or the pin 53 thereof mounted fixedly thereon on the one hand and the ball mounting 71 or the mirror arm 54 on the other and may be adapted to be influenced by the relative position between the mirror housing 51 or pin 53 and ball mounting 71 or mirror arm 54 in such a manner that after pivoting of the mirror housing 51 into the laterally and/or vertically pivoted position the switch 90 is closable.

WHAT I CLAIM IS:—

1. A rearview mirror for a vehicle or the like, the mirror having a support; a mirror plate pivotally mounted for pivoting about a first axis and a second axis relative to the support; means for mounting the support on a vehicle bodywork so that the first axis is substantially vertical and the second axis is substantially horizontal; remotely controllable adjusting means for adjusting the position of the mirror plate relative to the support guide, means for guiding the pivotal movement of the mirror plate; and a damping device for damping the pivotal movement of the mirror plate.

2. A mirror according to Claim 1, wherein the mirror plate is mounted fixedly in a mirror housing (51) and the latter is pivotal by means of a ball joint (69) on an arm (54), characterized in that the remotely controllable adjusting means operatively engages the mirror housing.

3. A mirror according to Claim 2, characterized in that on a pin (53) fixedly connected to the mirror housing (51) adjacent the ball joint (69), either between the latter and the mirror housing (51) or on the side of the ball joint (69) remote from the mirror housing (51), an end (57) of an electromagnetic lift and/or pull magnet (58) constituting the adjusting means, engages articulately, the magnet being secured with its other end to the arm (54).

4. A mirror according to Claim 3, characterized in that the magnet (58) is secured articulately to the arm (54).

5. A mirror according to Claim 2, 3 or 4, characterized in that the damping device (60) damps the pivotal movement of the mirror plate which is returned by a spring (59).

6. A mirror according to any one of Claims 2 to 5, characterized in that on the arm (54) a control disk (61) is mounted and comprises a control slot (63; 66, 67) constituting said guide means, through which slot a pin (53) fixed with respect to the mirror housing passes and along the edges of which the pin (53) is guided during the pivotal movement of the mirror plate.

7. A mirror according to Claim 6, characterized in that the control disk is rotationally adjustable.

8. A mirror according to Claim 6 or 7, characterized in that the control slot comprises a vertical slot (66) and a horizontal slot (67) which merge into one another, a guiding of the pin (53) along the vertical slot resulting in vertical pivoting of the mirror housing (51) about a substantially horizontal axis (33) downwardly (angle β) and along the horizontal slot (67) in a lateral pivoting about a substantially vertical axis (32) outwardly (angle α) and back.

9. A mirror according to Claim 6 or 7, characterized in that the control slot is constructed as an inclined slot (63) which is inclined within a planar coordinate system in such a manner that a guiding of the pin (53) along the inclined slot (63) results in a vertical pivoting (angle β) about a substantially horizontal axis (33) downwardly and simultaneously a lateral pivoting (angle α) about a substantially vertical axis (32) outwardly, and back.

10. A mirror according to any one of Claims 3 to 9, characterized in that the pin (53) fixed with respect to the mirror housing is non-rotatable about the pin longitudinal centre axis (68) with respect to the arm (54) supporting the mirror housing (51) but is rotatably mounted about the other two space axes (32, 33) each at right angles thereto.

11. A mirror according to Claim 10, characterized in that the ball (69) fixed on the pin (53) comprises on a peripheral major circle which lies within a ball diametrical plane containing the ball centre point, the pin longitudinal centre axis (68) and the spatially vertical axis (33) or horizontal axis (32) and a groove-like recess (70) open towards the ball outer surface and that on the arm (54) in the ball mounting (71) thereof a securing pin (72) is arranged which extends at right angles to the pin longitudinal centre axis (68) and in the direction of the spatially vertical or horizontal axis (33, 32) through the ball centre point and within the said ball diametrical plane, said pin being mounted by means of a thread adjustably in the ball mounting (71), said pin engaging with its end (74) into the recess (70) spaced from the bottom of the recess (70).

12. A mirror according to Claim 11, characterized in that the pin is a bolt (73).

13. A mirror according to Claim 11 or 12, characterized in that the recess (70) extends, seen within the ball diametrical plane in the ball peripheral direction, substantially over 180° peripheral angle from a ball outer area lying substantially on the pin longitudinal centre axis (68) through the ball (69) to a diametrically opposite ball outer area also lying substantially on the pin longitudinal centre axis (68).

14. A mirror according to any one of Claims 11 to 13, characterized in that the recess (70), seen within the ball diametrical plane, runs with its bottom outwardly substantially arcuately and with depth decreasing towards both sides arcuately terminates at the recess ends.

15. A mirror according to any one of Claims 3 to 9, characterized in that the pin (53) for non-rotatable mounting about its longitudinal centre axis (68) comprises on its length portion extending within the control slot (63) at its outer surface facing the guide edges of the control slot (63), planar slide faces (75, 76) aligned in the direction of the guide edges, which are in contact with the guide edges of the control slot (63) and bear on the latter to secure the pin (53) against rotation about its longitudinal centre axis (68).

16. A mirror according to Claim 15, characterized in that the planar slide faces (75, 76) are formed on two opposite outer surfaces.

17. A mirror according to Claim 15 or 16, characterized in that the slide faces are parallel to one another.

18. A mirror according to Claim 15, 16 or 17, characterized in that the slide faces are in the form of plane chamfers.

19. A mirror according to any one of Claims 3 to 9, characterized in that the pin (53) for non-rotatable mounting about its longitudinal centre axis (68) comprises on the length portion at which the end (57) of the electromagnetic lift and/or pull magnet (58) engages articulately on two opposite outer surfaces a planar face (78, 79) which extends parallel to the path of the guide edges of the control slot (63), that at the end of the electromagnetic lift and/or pull magnet (58) a fork (80) comprising two parallel flat legs (81, 82) is arranged which engage over the pin (53) at the plane faces (78, 79) and hold said pin non-rotatably about its longitudinal centre axis (68), the flat legs (81,82) being connected via a bearing pin (83), passing through said legs and the pin (53) substantially transversely,

articulately about the bearing pin axis to the pin (53), and that the electromagnetic lift and/or pull magnet (58) is aligned with its longitudinal centre axis in the direction of the control slot (63), and is mounted with the end opposite the fork (80) by means of an end fork (84) on the mirror arm or the ball mounting articulately about an axis extending parallel to the bearing pin axis (83) in spaced relationship therewith.

20. A mirror according to Claim 8, characterized in that the pin (53) comprises on its longitudinal section extending within the control slot (60, 67) a square cross-sectional profile whose width in the vertical and horizontal direction corresponds approximately, at the maximum, to the slot width of the horizontal slot (67) or vertical slot (66).

21. A mirror according to any one of Claims 3 to 20, characterized in that an electrical, optical and/or acoustic indicating means is provided which provides an optical and/or acoustic control indication (88) within the vehicle and comprises a switch (90) connected into the power supply circuit (89) of the control indication (88), said switch being actuable as a result of the pivot actuation of the mirror into the laterally and/or vertically pivoted position (angle α and/or β) and closable for supplying the control indication (88).

22. A mirror according to Claim 21, characterized in that the switch (90) is disposed between the mirror housing (51) or the pin (53) thereof mounted fixedly thereon on the one hand and the ball mounting (71) or the mirror arm (54) on the other and is adapted to be influenced by the relative position between the mirror housing (51) or pin (53) and ball mounting (71) or mirror arm (54) in such a manner that after pivoting of the mirror housing (51) into the laterally and/or vertically pivoted position the switch (90) is closable.

23. A mirror according to Claim 21 or 22, characterized in that the switch (90) is disposed at the end of the control slot (63) opposite the end associated with the rest position of the pin (53) in the control slot (63).

24. A mirror, substantially as described herein with reference to and as illustrated by the accompanying drawing.

25. A mirror according to Claim 1, substantially as hereinbefore described.

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1566451 COMPLETE SPECIFICATION
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Sheet 1

Fig.1

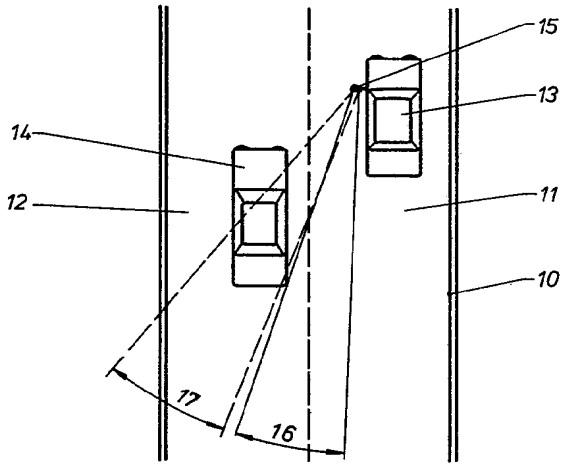
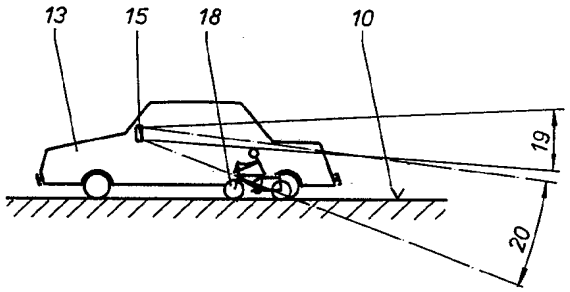


Fig.2



1566451 COMPLETE SPECIFICATION
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Sheet 2

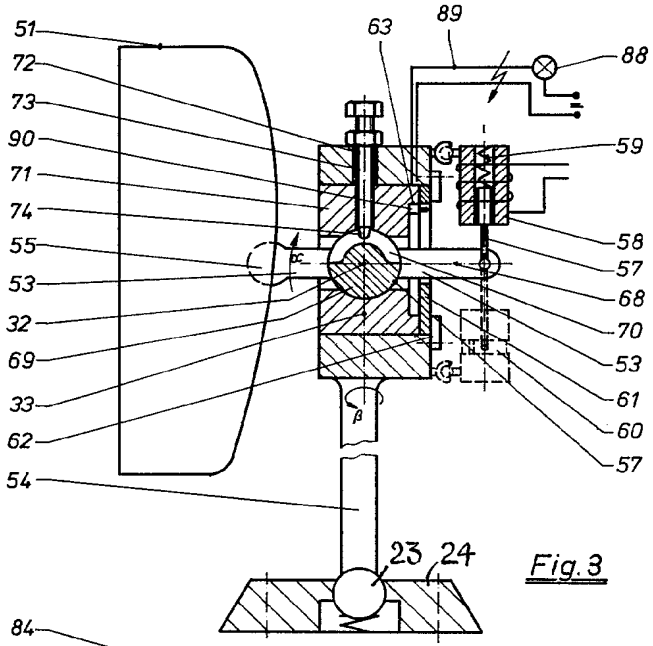

Fig. 3

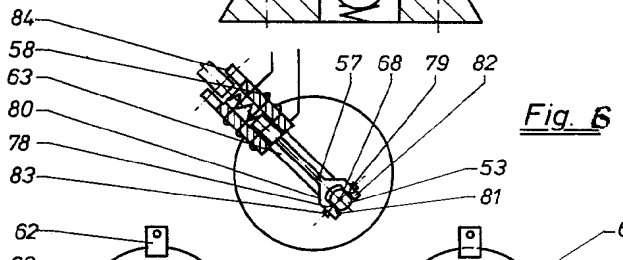

Fig. 6

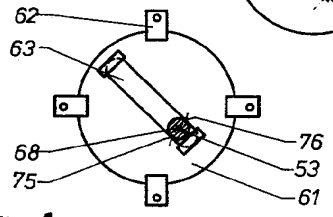

Fig. 4

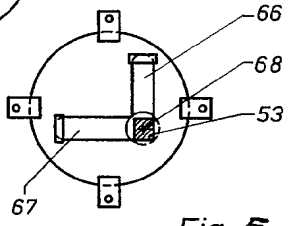

Fig. 5